

MODERN CONCEPTS OF CARDIOVASCULAR DISEASE



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Management of Medical-Dental Problems in Patients with Cardiovascular Diseases*

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THE PROBLEMS

Anticoagulants—continuation or withdrawal during dental surgery?

Hospital or office for dental extractions?

Anesthetics—local or general?

Intravascular injection dangers?

Preliminary sedation?

Vasoconstrictors with local anesthetics?

Bacteremia prophylaxis or subacute bacterial endocarditis (S.B.E.) prophylaxis — and how?

INTRODUCTION

In spite of constantly improving techniques in dental care, the accompanying hazards thereof in persons with cardiovascular disease will increase unless physicians and dentists, alerted to the rapid changes in their overlapping fields, can achieve effective cooperation. Currently, over 54 per cent of all deaths in the United States are of cardiovascular origin. Thus, in our ever-enlarging older population, an even higher percentage of patients who seek dental care will have cardiovascular disease. Recent advances in cardiovascular therapy, such as the widespread use of anticoagulants over long

periods of time, present new, major, potential medico-dental hazards.

The physician should discuss with the dentist the important features of any cardiovascular disease present, as well as any phases of therapy which may bear on the hazards of dental procedures. Physician advice to the dentist has, in the past, been contradictory but positive and often ill-conceived. The purpose of this paper is to present a precise summary of the rapidly changing and more controversial aspects of our interrelated problems, with the hope of achieving effective enlightened cooperation.

DENTAL SURGERY DURING CONTINUOUS ANTICOAGULANT THERAPY

The use of anticoagulants is increasing rapidly. The belief is growing that many patients with coronary artery disease should be kept on anticoagulant therapy permanently. Some types of actual or threatened strokes are also considered indications for the long-term use of anticoagulant drugs.

The reported results of the continuation or stoppage of anticoagulant therapy for dental extraction are somewhat conflicting. The sudden withdrawal of anticoagulant drugs, especially if combined with anticoagulant interruption with menadione, may cause thrombosis or embolism.^{1,2} If anticoagulant drugs are continued, profound bleeding may occur.²⁻⁴

Current experience^{1,2,5,6} shows that the danger of clotting when anticoagulant drugs are

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stopped is greater than is the danger of bleeding with the drugs, provided that proper safeguards are used. The blood prothrombin time should be held in the low optimal range. Thus, the prothrombin time in seconds should be about one and one-half times the control time (always less than two times the control time). A technique, such as that of Behrman and Wright,⁶ should be carefully followed. This includes: (a) advising hospitalization; (b) constant pressure to the involved tissues during the surgical procedure; (c) the placing of foamed gelatin in each socket; (d) multiple sutures placed under tension; (e) heavy biting pressure for one-half hour, maintained by biting on gauze pressure packs; (f) ice packs, one-half hour on and one-half hour off, applied externally for 48 hours; and (g) withholding mouth rinses and hot liquids for 48 hours and maintaining a soft diet for 48 to 72 hours.

OUTPATIENT TREATMENT OR HOSPITALIZATION

Generally speaking, a fully ambulatory cardiac patient without cardiovascular symptoms who is physically capable of attending a dental office is suitable for outpatient care.⁷ Exceptions would include most patients on anticoagulants or patients expected to have difficult extractions (impacted teeth or previous history of difficult extractions).

LOCAL OR GENERAL ANESTHESIA

Local anesthesia, properly used, is nearly always the anesthetic of choice. Proper use includes preliminary aspiration and the use of judicious amounts of vasoconstrictors. Coronary or syphilitic heart disease and congestive failure increase the hazards of general anesthesia. In dental surgery, general anesthesia is usually not necessary except in the very young or in the occasional uncooperative adult. If a general anesthetic is used, it should be done only in a hospital and by a specialist in anesthesiology.

IMPORTANCE OF PRELIMINARY ASPIRATION IN USE OF LOCAL ANESTHETICS

Intravascular injection of local anesthetics presents a real danger, especially to patients with cardiovascular disease. Current dental practices are such that this hazard is a very real and practical one. Without special precautions, dangerous concentrations of local anesthetics and/or added vasoconstrictors may be inadvertently produced, and death or serious

cardiovascular complications can result. Intra-arterial injections provoke distant anesthesia and blanching, while intravenous injection may cause central nervous system stimulation or depression and produce hypertensive crises or dangerous degrees of myocardial ischemia. Most reactions to local anesthetic drugs in dentistry are probably of this origin. Most physicians are not aware of the fact that *most dentists inject local anesthetics with an instrument which does not allow preliminary aspiration*. Harris' experiments⁸ show that it is usually impossible to detect the presence of a needle in a blood vessel with the "blind" apparatus now in common use. He reported, in 8,534 cases, a total of 3.2 per cent of "bloody taps" which could not be detected unless the plunger of the (injection) syringe or cartridge was slightly, but definitely, withdrawn with the needle at the site of injection. The frequency of undesirable side effects was reduced by aspiration to a very impressive degree (from 8.8 to 3.8 per cent). Aspirating cartridge syringes, while not yet in general use, are now on the market. They provide all the convenience of cartridges with the additional advantage of increased safety for the patient; at the same time, they promise fewer anesthetic failures, as well as fewer anesthetic "reactions" and fewer frights.

PRELIMINARY SEDATION

In cardiac patients with coronary, hypertensive, or syphilitic heart disease, or with congestive heart failure from any cause, preanesthetic sedation with short-acting barbiturates is advised. Patient apprehension may thus be decreased and blood pressure rises minimized or prevented in the waiting-room period, as well as in the dental chair.⁹ Furthermore, preanesthetic sedation with barbiturates is thought to protect against toxic reactions from local anesthetic agents. Because of their short-acting period and wide use, pentobarbital in a dosage of 30 to 60 mg., or secobarbital in a dosage of 50 to 100 mg., are satisfactory for most adults. Since occasional patients react unfavorably, or even paradoxically, to these drugs, satisfactory previous experience should be known. The medication should be given in the waiting room at least 45 minutes before the surgical procedure. All individuals who take barbiturates should have someone accompany them to the dentist's office as a precautionary measure against injury. Tranquilizing (ataractic) drugs may, on occasion, be used instead,

if previous experience has shown that the individual achieves better relaxation with these than with the barbiturates.

USE OF VASOCONSTRICTORS IN LOCAL ANESTHETICS

At present, most physicians advise dentists to use local anesthetics which do not contain vasoconstrictors in patients who have coronary or hypertensive heart disease or congestive heart failure. Most dentists are reluctant to accept this advice, since they know it necessarily must result in inadequate local anesthesia. Advice by physicians appears to have been based largely on contradictory "armchair advice" in the literature, plus failure to understand current concepts of local anesthesia. Thus, at the request of a dental group, a special committee of the New York Heart Association, in 1955,¹⁰ advised the dentist to obtain knowledge from the physician as to the nature and severity of the heart disease and the current medication in use, and to make certain that no more than 10 cc. of 1:50,000 epinephrine (0.2 mg.) is administered in one session. This seems quite reasonable and conservative. On the other hand, a few months later, an editorial in the *Journal of the American Medical Association*¹¹ stated "... it seems wiser to avoid the use of epinephrine in patients with hypertensive or coronary heart disease . . .," but condoned procaine 1 per cent in amounts up to 5 cc. These two conflicting opinions have been widely quoted in subsequent medical literature and in medical textbooks. It has now been thoroughly established that local anesthetics leave local tissues and enter the blood stream very rapidly if given without a vasoconstrictor. The vasoconstrictor "builds a fence" around the injection area by restricting vascular flow through it, thus delaying absorption of the anesthetic and prolonging anesthesia. Some local anesthetics, such as procaine, are actually local vasodilators if given without vasoconstrictors. Vasoconstrictors also produce temporary hemostasis. The dental profession knows that satisfactory local anesthesia without vasoconstrictors is practically impossible and, furthermore, entails the added risk of introducing large amounts of local anesthetics, most of which are depressants to the heart in relatively high concentration. Studies of the effect of local anesthetics on human blood pressure during dental procedures⁹ suggest that the patient's epinephrine may be produced in much larger quantities than are supplied by the needle if pain is not alleviated by effective anesthesia.

Physicians have been surprisingly conservative in drug-dosage advice to dentists, as compared with some of their own practices. Thus, intravenous procaine (30 to 70 mg.) had rather wide use as a depressant in the treatment of acute arrhythmias before procaineamide was developed. A total of 5 cc. of 1 per cent procaine solution, injected as a local anesthetic without vasoconstrictors, would administer 50 mg.; a comparable dose.¹¹ Advice to inject 1 per cent procaine at a rate of not over 16.6 mg. per minute is reasonably conservative. This would be at the rate of 5 cc. of 1 per cent procaine per three minutes. Although as little as 0.5 mg. of epinephrine (0.5 cc. of 1:1,000 solution) has been known to cause fatal cerebral hemorrhage in hypertensive patients, it is fair to point out that 0.3 to 0.5 cc. (0.3 to 0.5 mg.) has been advised subcutaneously to try deliberately to provoke angina pectoris as a diagnostic test! (This test has been abandoned because it is considered somewhat dangerous, although the author cannot find reports of fatalities.) Furthermore, from 0.5 to 1 cc. (0.5 to 1.0 mg.) is frequently used subcutaneously in the treatment of various allergic conditions or even some cardiac emergencies, although great care must be taken to see that intravascular injection is scrupulously avoided. I believe the advice of the New York Heart Association¹⁰ to use not more than 10 cc. of 1:50,000 epinephrine (0.2 mg.) in one session is quite conservative, but probably adequate.

There are undoubtedly several satisfactory local anesthetics in current use. Patient sensitivity and/or patient prejudice often dictate a change to an alternative anesthetic.

Since procaine has a slight vasodilating effect, it cannot be used effectively without vasoconstrictors. A 1:50,000 epinephrine solution of procaine should be quite satisfactory. Since lidocaine hydrochloride and mepivacaine hydrochloride are not, by themselves, vasodilators, and indeed appear to have some slight vasoconstrictor effect, smaller amounts of added vasoconstrictors are usually satisfactory. Epinephrine, 1:100,000 with Xylocaine, or 1:20,000 Neo-Cobefrin with Carbocaine appear to have definite advantages over either of these without vasoconstrictors.^{12, 13} *Minimal adequate amounts of vasoconstrictor drugs with local anesthetics are thus advised in patients with heart disease, provided preliminary aspiration with special aspirating equipment is insured and provided injection is given slowly.*

PROPHYLAXIS AGAINST BACTERIAL ENDOCARDITIS

One of four or five cases of subacute bacterial endocarditis (S.B.E.) occurs subsequent to dental work. From 50 to 80 per cent of patients have bacteremia during dental extraction or extensive dental procedures, especially in the presence of badly infected gums. The most common organism noted and the organism causing the overwhelming majority of S.B.E. is the commonest (saprophytic) organism in the mouth, *Streptococcus viridans*. The transient bacteremia which accompanies extensive dental work, and probably subsequent S.B.E., can be minimized by the use of relatively large doses of some antibiotics. *It is important to point out that the dosage regimen employed for long-term prophylaxis against group A streptococci in patients susceptible to rheumatic fever are inadequate for preventing bacterial endocarditis.* Considerable controversy exists as to the best methods of prophylaxis, since chemotherapeutic elimination of bacteremia induced by dental manipulation is not necessarily synonymous with the amount of prophylaxis necessary to prevent S.B.E.^{14, 15}

The American Heart Association's statement on prophylaxis, revised in 1957 and 1960,¹⁶ offers a good consensus formula:

One hour before the surgical procedure, 600,000 units of procaine penicillin, supplemented by 600,000 units of crystalline penicillin, intramuscularly, should be given. For two days after surgery, 600,000 units of procaine penicillin, intramuscularly, should be given each day. An alternative method is to give 500,000 units of buffered penicillin G or penicillin V, orally, four times a day the day of surgery and for two days after surgery, supplemented by a 600,000-unit injection of crystalline penicillin, intramuscularly, one hour before the surgical procedure. This should be done with dental extraction or with extensive traumatic procedures, especially in the presence of infection, in all patients who have congenital heart defects or rheumatic fever-scarred valves. For patients sensitive to penicillin, erythromycin can be used in a dosage (for adults) of 250 mg. by mouth, four times daily, over this same three-day period.

CONCLUSIONS

1. In patients with cardiac disease, anticoagulants can be safely continued during dental extractions if the blood prothrombin time is kept at about one and one-half the control time, and a special regimen followed.^{5, 6}

2. Fully ambulatory cardiac patients (except some who are on anticoagulants) are usually suitable for out-patient care.

3. Local is nearly always preferable to general anesthesia.

4. Local anesthesia in dentistry is usually induced with instruments which do not allow preliminary aspiration; this is dangerous, particularly in the presence of cardiac disease. Intravascular penetration occurs in 3.2 per cent of injections, unless special aspirating syringes are used.

5. Vasoconstrictor agents are necessary for good local anesthesia. Several good local anesthetics that contain reasonable amounts of vasoconstrictors are now available. If injected slowly, in proper amounts, with special equipment to prevent intravascular injection, they can be given with a high degree of safety.

6. Preliminary sedation is advisable.

7. Moderately large doses of penicillin should be given orally or by injection the day of, and for two days after, extractions or extensive dental procedures in the presence of congenital heart disease or rheumatic valvular disease.

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